

# **INSPIRE in Denmark and its impact on the Danish eGovernment**

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**Key words:** INSPIRE, eGovernment, SDI, Basic data, common components.

## **SUMMARY**

The implementation of the INSPIRE Directive is well underway in Denmark. With law on Infrastructure for Spatial Information, Denmark has a solid foundation for the further development of the national infrastructure for spatial information. A development built upon a longstanding collaboration across the Danish public sector on common agreements and solutions.

An example of a common solution is the geoportal “geodata-info” which consist and distribute metadata of the Danish spatial data and services – among those the identified INSPIRE-data and services (e.g. view and download).

The new common public digital strategy is focusing on reusing data. Public authorities detect a wide range of information about citizens, businesses, real estate, buildings, roads, etc. and a small but very important part of these data are used again and again across the entire public sector. Such data are called basic data. They are the foundation for the authorities to discharge their duties properly, for citizens and legal certainty for companies and for society as a whole performance. Therefore suggest the common public digital strategy to make certain basic data authoritative as a unique data foundation for e-government secured.

The law on Infrastructure for Spatial Information has provided a beneficial opportunity to strengthen the governance structure in the Danish spatial data domain. It has led to the establishment of the Coordination Committee for the Infrastructure for Spatial Information. The Committee is responsible for governance of the statutory tasks that are defined in the Law, as well as it exercises governance on a mutual agreement basis in line with the cooperation approach exercised across state, regions and municipalities in Denmark.

The Coordination Committee has been involved in the task to identify the authorities that is responsible for the data sets that is covered by the annex II and III of the INSPIRE Directive. The National Survey and Cadastre has a priori to the consultation of the Data Specifications for annex II and III in June 2011 identified the relevant authorities and the Coordination Committee has approved the result.

# **INSPIRE in Denmark and its impact on the Danish eGovernment**

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The concrete implementation of the European spatial infrastructure, INSPIRE, is moving fast forward in Denmark. The implementation of the Infrastructure for Spatial Information Act and thus the implementation of the INSPIRE Directive is well progressing with implementation of a range of standardized services. This means that public authorities can cooperate on a common basis in their daily work.

In 2011 there has been created access to spatial datasets under the INSPIRE Directives Annex 1 through standardized discovery and view services. To ensure that all services are running with reasonable uptime and performance a number of requirements for service quality and a method of measuring if requirements are met. Finally, in 2011, was made an EU consultation of data specifications for the themes of the Annex 2 and 3 themes. 11 Danish authorities have commented the specifications and Coordinating Committee on Infrastructure for Spatial Information has subsequently coordinated the Danish consultation with the EU Commission.

## **1. CLIMATE CHANGES AND THE NEED FOR A SDI**

The national SDI plays a key role across the public sector's administrative levels and areas and in the internal digitization process across the Ministry of the Environment.

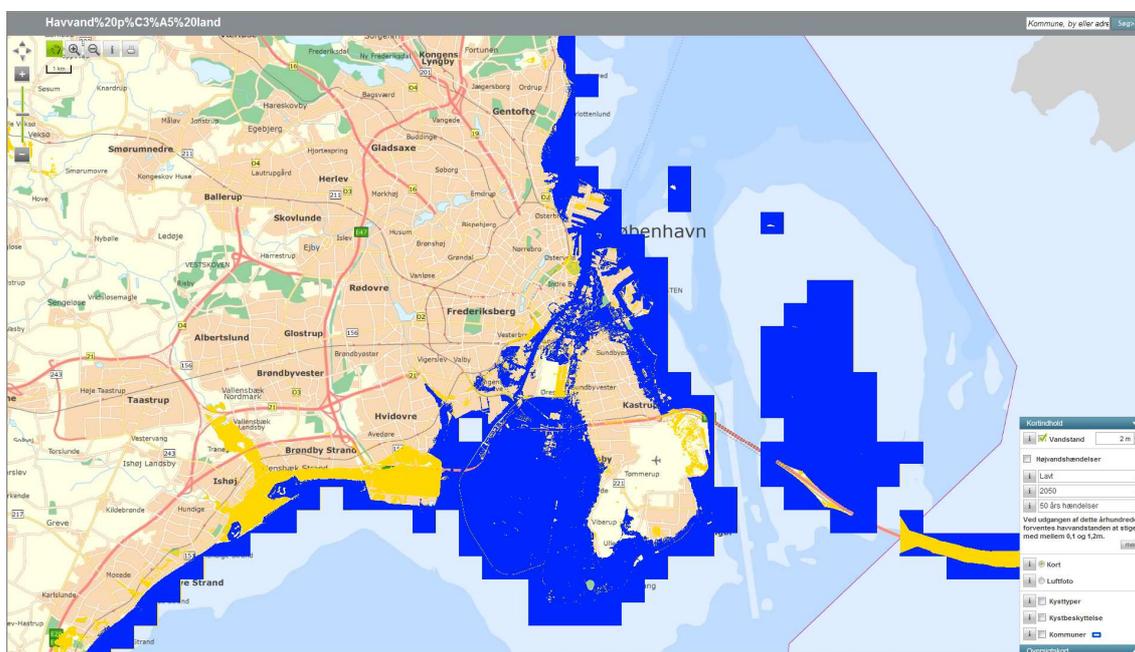
An actual and concrete example is the climate change-task, which all countries are dealing with these years. The second of July 2011 an extreme rainfall hit Copenhagen and the surrounding areas. This extreme climate-change-episode has made it clear that geographical information is important and needed. It is crucial that municipalities, regions and state can use detailed elevation data and elevation models, in their joint efforts to ensure roads, buildings, nature and the environment from flooding in the future.

The Digital Elevation model can be used to make assessments of where the water runs across when it has rained. Hereby vulnerability maps can be developed that tell where you have to be extra vigilant.

The Digital Elevation model is used in The Danish Portal for Adaptation to Climate Change. The portal presents existing knowledge on climate change and climate change adaptation within a number of areas. The information is targeted at individuals, municipalities and businesses. The portal provides information on the newest research and development within climate change adaptation in Denmark and abroad. The portal also contains a number of specific examples (case descriptions) of adaptation measures.

The portal includes the possibility to view graphic representations of climate data and find information on regional climate change in Denmark. Interactive tools and systems

to support decision-making are available on the portal. It is anchored in a cross-cutting Coordination Forum for Climate Change Adaptation, including representatives from nine ministries, Local Government Denmark and Danish Regions.



Screen dump of The Danish Portal for Adaptation to Climate Change, see: <http://www.klimatilpasning.dk/en-US/Sider/ClimateChangeAdaptation.aspx>

## 2. GOVERNANCE, AN ESSENTIAL ELEMENT IN A SDI

The Infrastructure for Spatial Information Act constitutes a legal basis for developing the SDI in accordance with the EU's INSPIRE Directive.

### 2.1 The infrastructure for spatial information act

The act implements the regulations, principles and associated guidelines of the INSPIRE Directive into Danish law. With the Infrastructure for Spatial Information Act, Denmark has strengthened the framework for the national SDI and its links with eGovernment.

The Act includes two significant additions to the text of the EU Directive:

1. The Danish Minister for the Environment can extend the provisions of the Act to data other than those covered by the Directive.
2. The Minister for the Environment can, in collaboration with other public sector stakeholders, determine which data sets should serve as the common basis for eGovernment.

So far it has not been necessary to activate the first addition – the scope the data in the three INSPIRE-annexes is so large that all kind of spatial data is covered. The second addition is now active and in process in the work of establishing a common public

digital strategy, where the data-foundation – called "Basic data" is playing a very central role.

With the Infrastructure for Spatial Information Act the Coordination Committee on Infrastructure for Spatial Information has been established and the committee forms a structure for cooperation and decision-making in the field of spatial data.

#### 2.1.1 The Coordination Committee

The Coordination Committee on Infrastructure for Spatial Information is working to facilitate and support the further development of an effective national SDI based on the activities defined in the provisions of the Infrastructure for Spatial Information Act.

The Coordinating Committee consists of public authority representatives and other owners of spatial data that are covered by the Infrastructure for Spatial Information Act.

Building a shared public infrastructure for spatial information requires cooperation, and governance structure is still under development. There is focus on building up collaboration in the area and that all contribute to the development of a common infrastructure, with elements that work together across the public sector. The Coordination Committee on Infrastructure for Spatial Information is a cornerstone of this management structure and is also part of the management structure for the common public digital strategy.

## **2.2 Shared public sector spatial data**

Clearly defined and jointly approved spatial data are the basis for the efficient execution of public sector activities.

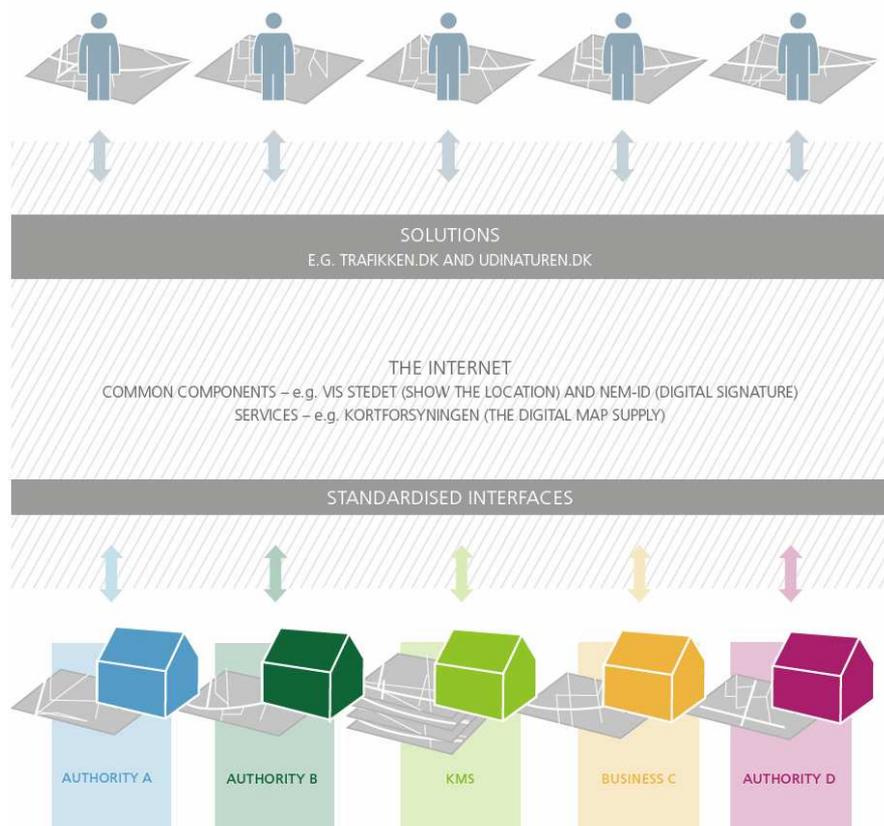
Spatial information is collected in various contexts and by many organisations, often based on an organisation's specific requirements related to its field of operations. Many types of spatial information however are being used beyond their original purpose by other organisations and in new contexts. It is thus necessary to ensure that all authorities use a recognised, clearly defined and shared foundation for carrying out their respective activities.

Spatial data should contribute to the efficient execution of public sector operations. This requires consensus among public agencies with regard to common standards, functionality, content and the allocation of responsibilities and obligations for the collection, maintenance, distribution and use of spatial data. This requires that the individual stakeholders are committed to base their work on the shared infrastructure and to make their own data available for activities across the public sector – this reference-architecture is illustrated in the figure below.

Furthermore this means, that spatial data must be made available for use across organisational boundaries, and that data should be collected only once, maintained where this can be done most effectively and made easily retrievable and applicable.

As part of the development of the national SDI, The National Survey and Cadastre and the municipalities have developed a shared, comprehensive geographic foundation for eGovernment (“FOT” in Danish). The Ministry of the Environment with the Danish Nature and Environment Portal and PlansystemDK has made significant progress in incorporating the SDI principles in several administrative systems and contexts.

GENERAL PUBLIC, BUSINESSES AND THE PUBLIC SECTOR



Architecture for the sharing and use of shared spatial data from different public authorities.

### 3. THE COMMON PUBLIC DIGITAL STRATEGY AND “BASIC DATA”

A new common public digital strategy is adopted. The common public digital strategy focus on establishing a common data foundation and that data must be recycled. Geographic information is an important element in this common cooperation and helps to create consistency across authority-levels - spatial information is rapidly becoming an integral part of e-government.

It is politically recognized that spatial information is an essential starting point for a good and effective eGovernment. Now work is underway to define which geographic data is essential for the creation of an effective government. Possibilities to aggregate spatial information across authorities are of great importance for the quality of everyday management. When geographic data from a number of authorities can be found,

coordinated and collated, it is easier to create a whole picture of what is happening at a given location.

Geographic information will often form a kind of frame of reference or serve as a basis on which other more specific data can be overlaid as themes, either within a single sector or by a more complex picture that includes data from multiple sectors.

The new common public digital strategy is focusing on reusing data. Public authorities detect a wide range of information about citizens, businesses, real estate, buildings, roads, etc. and a small but very important part of these data are used again and again across the entire public sector. Such data are called basic data. They are the foundation for the authorities to discharge their duties properly, for citizens and legal certainty for companies and for society as a whole performance. Therefore suggest the common public digital strategy to make certain basic data authoritative as a unique data foundation for e-government secured.

### **3.1 Basic data**

Basic data is characterized by:

- Basic data are public sector common basis for government,
- Basic data has to be efficiently updated in one place and could be used by all
- Basic data must be of high quality and have clear performance targets
- Basic data must be both well defined and documented
- Distribution of basic data has to be effective and reliable.

The common public digital strategy established basic data in different areas and they include:

- Land Survey, roads and property formation
- Buildings, homes, buildings and address formation
- Individuals' identity, residence, family relationships and residence basis
- Companies and their trusted persons
- Citizens income, wealth and relationship to work.

In total, 19 data themes are identified as fundamental to public administration. The geographic data that is considered common basic data is:

- Name of places
- Digital elevation model
- Divisions (regions, municipalities, jurisdiction, constituency etc.)
- Geographical Grid System
- Cadastral Parcels
- Easements
- Spatial addresses
- Location-based buildings on leased land
- Spatial located condominiums
- Coastline
- Natural areas (forests, etc.)

- Roads
- Railways and ferry routes
- Spatial located buildings
- Spatial located plants
- Watercourses
- Lakes
- Wetlands
- Sea areas

The first step is to get defined, specified and described the requirements for basic data. Lessons from spatial data are widely used in the designation of basic data, definition of data model and documentation and a common infrastructure for distribution of basic data.

Basic data should be available in a simple, efficient and stable way for the authorities to use basic data. The benefits of a common data distributed to more efficient distribution of basic data and a better payment models will be studied in connection with work on common public digital strategy.

#### **4. COMMON COMPONENTS**

The SDI should be widely used throughout public activities. This is been achieved through the establishment of common components and the common acceptance of conditions for their use.

It is essential that functional and cohesive common components are developed to support access to spatial data and functionality within eGovernment. A common component performs the work that is common for several applications, can be used in various contexts and can be incorporated in end-user solutions across multiple portals and authorities. A common component is typically not a complete end-user solution but a 'building block' that provides functionality.

An example of a common component is the geoportal "geodata-info.dk". Geodata-info.dk is the Danish geoportal that makes it possible for professional users as well as citizens interested in spatial data to search for spatial data and spatial data services. Geodata-info.dk also includes the Danish Discovery Service according to the INSPIRE Directive.

Geodata-info.dk contains descriptions of spatial data and services (metadata), both of those which are covered by the INSPIRE Directive and others. The descriptions are created by individual data owners (typically organizations within the public). It is free for the data owners to make spatial data and services available on the Geodata-info.dk. Data owners are responsible for that information is correct and accurate.

The Danish National Survey and Cadastre is responsible for the operation and continued development of Geodata-info.dk.

A good example is Danish Nature and Environment Portal decision that metadata are standardized and published in accordance with the specifications given by the Act on infrastructure for spatial information. The decision means that Danish Nature and Environment Portal's metadata are displayed in Geodata-info.dk and thus made accessible to all. National Environmental Portal is utilizing the functionality for editing, viewing, etc. that are already financed and developed in connection with the implementation of Law on Infrastructure for Spatial Information.

National Environmental Portal is the entrance to a common set of public data on the nature and the environment. At [www.miljoportal.dk](http://www.miljoportal.dk), citizens and environmental professionals retrieve relevant and updated data on Denmark's nature and environment. Denmark Area Information powered by the National Environmental Portal and exhibits through [www.dmp.dk](http://www.dmp.dk) broad range of environmental data. These are data for nature conservation, protected areas, building and protecting lines, agriculture, planning, soil and groundwater. National Environmental Portal is operated in cooperation between municipalities, regions and the Ministry of Environment.



Screen dump of the Denmark Area Information powered by the National Environmental Portal.

#### 4.1 The Digital Map Supply

The Danish National Survey and Cadastre makes its spatial information available on the Internet through the Digital Map Supply, thus helping to improve access and availability of spatial information.

The Digital Map Supply reduces the technological and economic barriers and increases the accessibility of updated spatial information. The Digital Map Supply involves

private partners and offers highly accessible data and functionality and associated support services.

Digital Map Supply can serve a central function in a variety of mapping applications. Spatial data from the Supply can be integrated into mainstream IT solutions and web services that have a geographical element. Digital Map Supply is build up by the principles of WMS/ WFS.

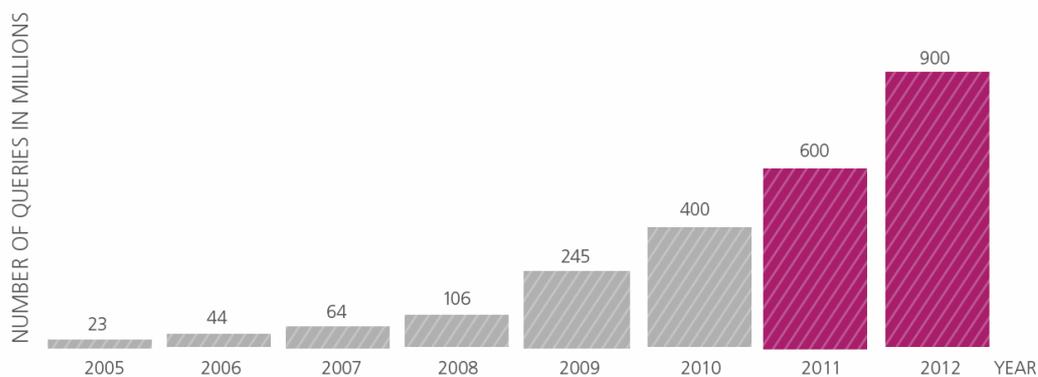
The Digital Map Supply is used in many public applications, including shared solutions such as:

- borger.dk;
- the Danish Nature and Environment Portal (DAI.dk);
- the Danish Nature Agency's local planning portal (plansystemDK.dk);
- the Danish Nature Agency's interactive map on nature and outdoor activities (udinaturen.dk);
- the Danish Road Directorate's traffic information portal (trafikken.dk);
- the Danish Enterprise and Construction Authority's Public Information Server (OIS) database;
- the Danish Register of Underground Cable Owners (LER).

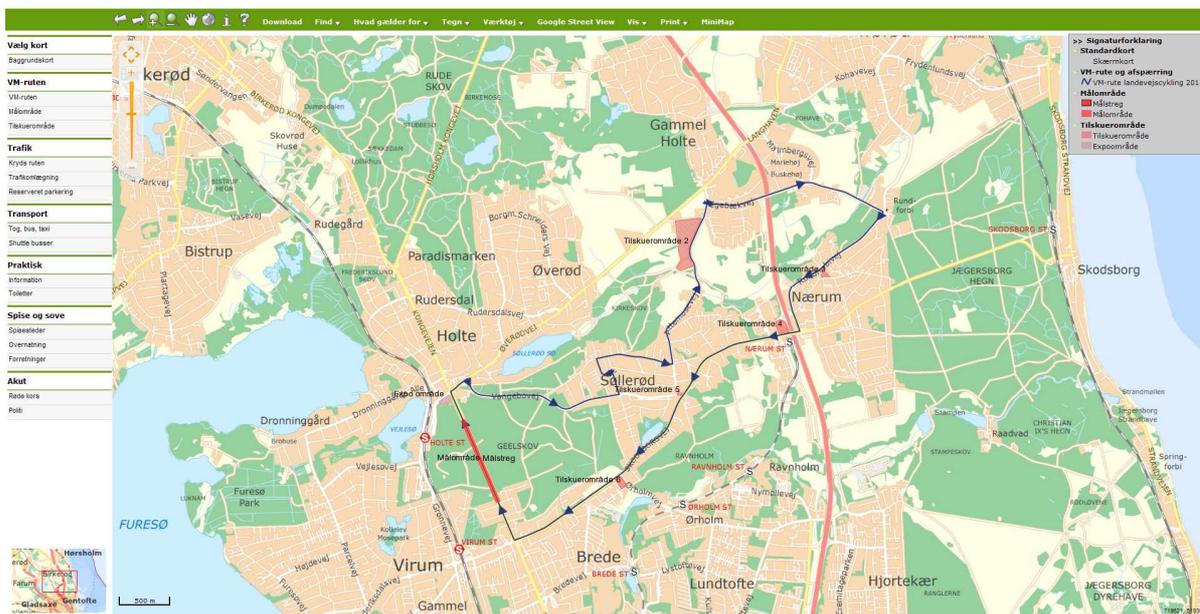
The annual traffic of The Digital Map Supply has in 2011 reached more than 600 million queries (663 mill.).

#### USE OF THE DIGITAL MAP SUPPLY:

ACTUAL ■ ESTIMATED ■



In autumn 2011 Copenhagen and some of the surrounding municipalities hosted the World Road Cycling event. Therefore part of the municipal streets and roads was closed to all vehicular traffic in different periods. This meant that a lot needed detailed information about which roads were closed and when. Demand for short, which contained this information was so great that The Digital Map Supply delivered approx. 4 million digital maps via the Internet for this purpose during the cycling World Cup's last 3 days, which corresponds to approx. 4 maps per second. It is quite a significant demand for a single application in a short time.



The course for the World Road Cycling 2011 [[http://kort.rudersdal.dk/index\\_default.html?profile=extern-vmcyklingnet](http://kort.rudersdal.dk/index_default.html?profile=extern-vmcyklingnet)].

## 5 DATA SPECIFICATIONS FOR ANNEX 2 AND 3, CONSULTATION

Denmark has chosen to let the data specifications of Annex I, II and III themes form the basis for the selection of authorities, which is responsible for data sets included in INSPIRE. The Danish implementation of INSPIRE is until now limited to the data sets (and those who are responsible for the data) that is included in Annex I. Specifications for annex II and III themes are not available before now and therefore are a qualified selection of Danish authorities now possible.

The Commission in late 2010 established 19 working groups (TWG), currently working to specify INSPIRE Annex II and III. The first opportunity for a broader and more specific influence on the specifications is in the hearing in the member states beginning in June. It is therefore essential to have identified potential and - seen in a consultation context for technical data specifications - relevant authorities prior to this hearing. Hereby they can be informed and participate in the hearing. This has meant that the process of identifying authorities has been initiated before data specifications have been completed.

The focus of the process has been chosen to be on identifying the data relevant authorities that are relevant to have to participate in the hearing. This means the authorities are aware of "spatial world" and having technically competent people in the organization. These people have to be able to read and interpret particular the relatively complex technical specifications and the relevant charts for data integration.

To help identify the data relevant authorities the tool "FORM-key task" has been used. FORM is a Business Reference Model. The core of FORM is a task list of public services to citizens and businesses. The task list is an analysis and structuring tool which provides an overview and a "common language" across the public sector.

FORM-Online  
Opgavenøglen v2.1

OPGAVENØGLE 38.NATUR OG NATURBESKYTTELSE

Opgavenøglen  
Finansloven  
Myndigheder  
Lovgivning

02 Internationale aftaler  
03 Udenrigstjeneste  
05 Samfundsstruktur  
06 Samfundøkonomi og statistik  
08 Borgerskab  
10 Uddannelse og undervisning  
12 Forskning  
14 Arbejdsmarked  
16 Kultur  
17 Fritid og idræt  
18 Kirke

**38 Natur og naturbeskyttelse** i § ↕ FL ↻

**38.30 Natur og klima** i § ↕ FL ↻

- 38.30.05 Naturforvaltning  
i § ↕ FL ↻ 4.
- 38.30.10 Naturbeskyttelse  
i § ↕ FL ↻ 4.
- 38.30.12 Kyster  
i § ↕ FL ↻ 4.
- 38.30.15 Offentlige rekreative områder  
i § ↕ FL ↻ 4.
- 38.30.20 Geologisk undergrund og råstofindvinding  
i § ↕ FL ↻ 4.
- 38.30.25 Klima  
i § ↕ FL ↻ 4.

Screen dump of the Business Reference Model (FORM) used to identify the relevant authorities.

After identifying the data relevant authorities several meetings and workshops for authorities have been conducted. The focus has been to introduce them to INSPIRE including the purpose of building a SDI - cost benefit and the work that awaits them as an authority of annex II and III data.

It has been a very interesting process. Not mostly because several of the identified authorities until now have not work a lot with spatial data, SDI and not known to INSPIRE. The EU Commission announced in June a preliminary version of the data specifications for Annex 2 and 3. In Denmark, 18 authorities were involved in a review of the specifications:

Annex	Data specification	Authority
2	Elevation	National Survey and Cadastre
	Land cover	Nature Agency
3	Ortho-imagery	National Survey and Cadastre
	Geology	Geological Survey of Denmark and Greenland, Nature Agency
	Statistical units	National Survey and Cadastre, National Board of Health
	Buildings	Enterprise and Construction Authority, National Survey and Cadastre
	Soil	Food Industry Agency, Danish Regions, Geological Survey of Denmark and Greenland
	Land use	National Survey and Cadastre, Food Industry Agency, Nature Agency
	Human health and safety	National Board of Health
	Utility and governmental services	Nature Agency, Energy Agency, National IT and Telecom Agency, Environmental Protection Agency
	Environmental monitoring facilities	Environmental Protection Agency, Nature Agency
	Production and industrial facilities	Environmental Protection Agency, Nature Agency
	Agricultural and aquaculture facilities	Food Industry Agency
	Population distribution — demography	Statistics Denmark
	Area management/restriction/regulation zones and reporting units	Environmental Protection Agency, Nature Agency, Maritime Authority, National Survey and Cadastre
	Natural risk zones	Nature Agency, Coastal Authority, Geological Survey of Denmark and Greenland, Emergency Management Agency, Weather Institut
	Atmospheric conditions/ Meteorological geographical features	Weather Institut
	Oceanographic geographical features	Weather Institut, Maritime Safety Administration
	Sea regions	Nature Agency, Coastal Authority
Bio-geographical regions	Nature Agency	
Habitats and biotopes	Nature Agency	
Species distribution	Nature Agency	
Energy resources	Energy Agency	
Mineral resources	Geological Survey of Denmark and Greenland, Nature Agency, Danish Regions	

The aim has been to clarify whether the specifications make sense in relation to different domain requirements in the Danish government, and how Danish spatial data fit the specification data models.

All the comments are now part of the further work to develop the data specifications. Parts of the data specifications are expected to be part of the implementation rule for interoperability, as the INSPIRE Committee will vote on in autumn 2012 and subsequently repealed the law of the Commission.

### 5.1 Strategy for managing environmental spatial data in Denmark

Good and effective environmental management requires easy and unhindered access to the information that can illuminate a problem in a timely and professionally relevant context, so that the presence of information helps to keep focus on the environmental issues and not on the provision of data and quality of these.

Environmental spatial data is one of the most important tools for decision support in the Ministry of the Environment, and is used in many processes, including planning, case management, and policy making etc. Against this background, credible, timely and accessible data on a consistent level of quality is essential for a reliable processing in the ministry.

Environmental data is in scope of the INSPIRE directive. No doubt about this fact. When a dataset is in scope of INSPIRE a list of tasks and obligations have to be carried out: Data has to be described by metadata, data has to be interoperable through standardization, data has to be accessible through services etc. So far the implementation of the directive has confirmed that many challenges have to be taking

care of. One of the main challenges is that the national infrastructure for the Danish environmental data is missing or at least is not working well.

The environmental spatial data currently exist in different versions and are not defined or described. In many cases, data are not nationwide, but only regionally nationwide as a result of the regional administrative units within the Ministry of Environment maintains data within their own geographical areas. Data follows no standardized structures, and therefore often can not be compared across the regional areas. One consequence of these problems is that there is not administered and managed by the same data basis across the Ministry.

There is therefore a great need to define a common model for handling spatial data in the Ministry of Environment with the aim that all users of spatial data and all employees that produce and maintain spatial data have the same understanding of how spatial data are handled. There are significant challenges to be addressed in order to create uniform practices for data handling in the Ministry of Environment.

The missing national infrastructure for environmental data is the reason for the development of a strategy in the Ministry of the Environment. The strategy will support an effective data management, which contributes to the tasks solved on the basis of credible data produced and published by common guidelines.

With the strategy it is expected that the Ministry can work effectively with nationwide, updated, reliable and accessible data set of uniform quality. This will also give the Ministry the needed foundation to make interoperable, standardized and well documented environmental spatial data accessible across Europe according to INSPIRE.

## **6 CONCLUSIONS**

Collaborations are working in Denmark to develop structures and elements that can be used widely and across the eGovernment. There are many initiatives underway and more will come - the need for geographic information is ever increasing. Without structures for coordination and management, it is difficult to achieve the objectives in a cost effective manner.

INSPIRE contributes to this with a significant subset, but the continued development of the national infrastructure for spatial information requires the cooperation and coordination - both the public in between and among the public and private. We need each other in a collaboration to make spatial information available easily, quickly and flexibly and in contexts and in ways we have not yet dreamed of.

## REFERENCES

The Digital Path to Future Welfare, eGovernment Strategy 2011-2015, The Danish government/Danish Regions/Local Government Denmark, 2011.

Location - a gateway to eGovernment, The Danish Ministry of the Environment, National Survey and Cadastre, 2011.

## BIOGRAPHICALS NOTES

2004: M. Sc. in geodesy, cadastral science and planning, University of Aalborg.

Brief career history:

2004-2007: Chartered surveyor in Copenhagen Municipality. Carried out cadastral work and measuring.

2007-2010: National Survey and Cadastre. Project Manager for projects concerning the cadastral map's use as reference data.

2010-...: Working with the coordination of the implementation of the INSPIRE Directive in Denmark. Especially concerning on having the contact and dialog with the authorities involved as data providers in the SDI.

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